34. (Amended) A method of making a layered magnetic structure comprising:

providing a layer consisting essentially of IrMnN having a (200) texture;

and

depositing a ferromagnetic layer on the IrMnN layer, wherein the structure has a blocking temperature of greater than 300°C.

Please cancel Claims 10 and 35.

REMARKS

Upon entry of this Amendment, Claims 1-9, 11-21, 34, 36 and 37 will be pending in the application. Claims 10 and 35 have been cancelled. Non-elected Claims 22-33 stand withdrawn by the Examiner.

By the present Amendment, Claim 1 has been amended to recite a film consisting essentially of IrMnN having a (200) texture. Independent Claims 9 and 34 have similarly been amended to recite a layer consisting essentially of IrMnN. Claims 1, 9 and 34, as amended, restrict the recited film composition to IrMnN and any additional elements which do not affect the basic and novel characteristics of the film. No issue of new matter is presented.

Claims 9 and 34 have also been amended to recite that the IrMnN layer has a (200) texture. The "(200) texture" was recited in original Claim 1, and is described in the specification, for example, at page 3, lines 24-27. Specifically, the recited "(200) texture" means the tendency for the film or layer to grow with its crystals predominantly square with the film surface. As discussed at page 3, lines 27-32 of the specification, the presently claimed IrMnN films with (200) texture are distinct from films which tend to form with a (111) orientation.

Independent Claims 9 and 34 have further been amended to recite that the layered magnetic structure has a blocking temperature of greater than 300°C. Basis for this amended claim language is provided in the specification, for example, at page 9, lines 10-12, and Fig. 10. Applicant has surprisingly and unexpectedly found that the claimed structures including IrMnN layers with (200) texture exhibit significantly improved blocking temperatures in comparison with similar structures which do not include the present IrMnN layers.

Claim 19 has been objected to due to a lack of basis for the term "seed layer". By the present Amendment, Claim 19 has been amended as suggested by the Examiner to remove the word "seed".

Claims 1-8 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Lin et al. '170 in view of Fuke et al. '049. According to the Office Action, Lin et al. '170 discloses a film comprising an IrMn alloy layer (i.e., IrMnNi) having a (200) texture. The Office Action acknowledges that Lin et al. '170 fails to disclose an IrMnN film, and relies upon Fuke et al. '049 as an alleged teaching that IrMnN films are known equivalents to the IrMn alloy films taught by Lin et al. '170. According to the Office Action, substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. The Office Action states that, in the instant case, IrMnNi and IrMnN are equivalents in the field of IrMn anti-ferromagnetic alloys. Applicants respectfully traverse this rejection.

Lin et al. '170 discloses a spin valve sensor including an anti-ferromagnetic pinning layer, e.g., element number 214 in Fig. 13. Lin et al. '170 discloses that the anti-ferromagnetic pinning layer 214 is made of nickel manganese (Ni-Mn) or nickel manganese-based alloys (Ni-Mn-M) where M is a third metallic element such as chromium, iron, iridium, palladium, platinum, rhodium and ruthenium (see page 2, paragraph [0014]). Thus, Lin et al. '170 teaches that the anti-ferromagnetic pinning layer must include Ni and Mn, and may optionally include a third metal selected from Cr, Fe, Ir, Pd, Pt, Rh and Ru.

Lin et al. '170 discloses that a nickel oxide first seed layer (layer number 304 in Fig. 13) has a {200} crystalline texture which is said to induce a {200} crystalline texture of the subsequently deposited layers of the spin valve sensor (see paragraph [0050], pages 4 and 5). Lin et al. '170 thus teaches that the {200} texture of the nickel oxide seed layer 304 causes the other layers of the structure to have a similar texture. The NiMn-based layer of Lin et al. '170 does not tend to grow with a (200) orientation. Absent the seed layer 304, Lin et al. '170 indicates that the remaining layers would not tend to form a {200} texture. This is directly contrary to the presently claimed IrMnN film having a (200) texture in which the film must have the tendency to grow with its crystals predominantly square with the film surface.

Fuke et al. '049 discloses an anti-ferromagnetic film comprising an IrMn alloy. At column 5, lines 33-38, Fuke et al. '049 discloses that the IrMn alloy may include additive components such as Ni, Cu, Ta, Hf, Pd, Ti, Nb, Cr, Si, Al, W, Zr, Ga, Be, In, Sn, V, Mo, Re, Co,

Ru, Rh, Pt, Ge, Os, Ag, Cd, Zn, Au and N. Although N is one of the many elements listed in the reference, no IrMnN compositions were actually made in any of the examples of Fuke et al. '049. Contrary to the presently claimed invention, Fuke et al. '049 states that the disclosed IrMn anti-ferromagnetic film forms a (111) plane orientation (see column 4, lines 59-62). Thus, to the extent that Fuke et al. '049 discloses an IrMn alloy that could possibly contain N, the reference makes clear that such a film would have a (111) orientation.

Applicant submits that the presently claimed invention distinguishes over Lin et al. '170 and Fuke et al. '049. The presently claimed film consists essentially of IrMnN having a (200) texture. The presence of nickel as required in the NiMn-based alloys of Lin et al. '170 is not explicitly recited in the present claims and, to the extent that nickel would materially affect the basic and novel characteristics of the presently claimed films, it is excluded from the present claims.

There is no teaching or suggestion in the prior art of record to modify the NiMn-based alloys of Lin et al. '170 in view of the IrMn-based films of Fuke et al. '049 to arrive at the presently claimed IrMnN films having a (200) texture. Although Fuke et al. '049 discloses both Ni and N in a long list of elements that could possibly be added to IrMn anti-ferromagnetic films, the reference makes clear that such films would have a (111) texture, not the presently claimed (200) texture.

Furthermore, Applicant disagrees with the Examiner's assertion that Fuke et al. '049 teaches that IrMnN films are known equivalents to the IrMn alloy films taught by Lin et al. '170. One skilled in the art would not consider Ni and N to be equivalents or interchangeable. At most, Fuke et al. '049 teaches that either Ni or N may be added as optional elements to IrMn-based alloys. Such alloys in which Ni is optional cannot be equated with the NiMn-based alloys of Lin et al. '170 in which Ni is required. The references relate to different families of alloys, and optional alloying additions to one family of alloys cannot be considered as equivalents in another family of alloys.

It is therefore submitted that Claim 1, and the claims that depend therefrom, are patentable over Lin et al. '170 and Fuke et al. '049.

Claims 9-13, 15, 17-21 and 34-37 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Lin et al. '170 in view of Fuke et al. '049, and further in view of Tanaka et al. (*IEEE Trans. Mag.*). This rejection is respectfully traversed.

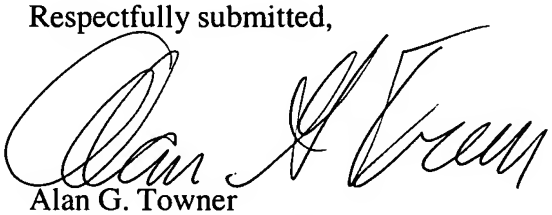
Independent Claims 9 and 34, as amended, recite a layered magnetic structure comprising a layer consisting essentially of IrMnN having a (200) texture. These recited features distinguish over Lin et al. '170 and Fuke et al. '049 for the same reasons discussed above in connection with Claim 1. Tanaka et al. does not remedy the above-noted deficiencies of Lin et al. '170 and Fuke et al. '049. Tanaka et al. does not teach IrMnN alloys, nor the formation of films having a (200) texture. Accordingly, independent Claims 9 and 34, and the claims that depend therefrom, are patentable over the prior art of record.

Furthermore, independent Claims 9 and 34 recite that the structure has a blocking temperature of greater than 300°C. As demonstrated in Figs. 9 and 10 and described at page 9, lines 8-12 of the specification, the presently claimed structure having an IrMnN layer achieves an unexpectedly improved blocking temperature of greater than 300°C in comparison with a similar structure having an IrMn layer. Fig. 9 of Fuke et al. shows several IrMnM films (including an IrMnNi film), all of which have a blocking temperature of less than 300°C. The blocking temperature recited in Claims 9 and 34 thus represents an unexpectedly improved result which further serves to distinguish over the prior art of record.

In view of the foregoing amendments and remarks, it is submitted that Claims 1-9, 11-21, 34, 36 and 37 are patentable over the prior art of record. Accordingly, an early Notice of Allowance is respectfully requested.

In the event that any outstanding matters remain in connection with this application, the Examiner is invited to telephone the undersigned at (412) 263-4340 to discuss such matters.

Respectfully submitted,



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Marked-up Version of Claims

1. (Amended) A film [comprising] consisting essentially of IrMnN having a (200) texture.

9. (Amended) A layered magnetic structure comprising:

a[n IrMnN] layer consisting essentially of IrMnN having a (200) texture; and

a ferromagnetic layer deposited on the IrMnN layer, wherein the structure has a blocking temperature of greater than 300°C.

19. (Amended) The layered magnetic structure of Claim 9, wherein the IrMnN [seed] layer is deposited on a substrate.

34. (Amended) A method of making a layered magnetic structure comprising:

providing a[n IrMnN] layer consisting essentially of IrMnN having a (200) texture; and

depositing a ferromagnetic layer on the IrMnN layer, wherein the structure has a blocking temperature of greater than 300°C.